

D-Dimer in inguinal hernias

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Abstract

Aim: This study aimed to find out whether there was a correlation between D-Dimer (DD) and inguinal hernia.

Material and Methods: Demographic data, direction of hernia, type of hernia, presence of local coexisting pathology, family history of hernia, presence of chronic disease, chronic obstructive pulmonary disease (COPD), hard labour / sports history, body mass index (BMI) of the patients operated for inguinal hernia are recorded: some laboratory parameters (DD) in blood, CRP, ESR, WBC, neutrophil ratio (NR), erythrocyte distribution range (RDW), AST, ALT, ALP, GGT) and their correlation with the patient features were analyzed. The results were analysed using the SPSS statistical program. The correlation between the groups was evaluated by Chi-square test. $p < 0.05$ was considered significant.

Results: Total 109 patients operated for inguinal hernia. 34 of 109 patients had DD high (31%). A statistical significance was found between DD and those with chronic diseases, WBC, RDW, NR, type of hernia, family hernia history, heavy labour/sports history and COPD ($p < 0.05$).

Conclusion: DD may constitute an important auxiliary marker in suspected femoral hernia and strangulated hernia. DD in primary hernia was significantly higher than the recurrent hernias and DD rate in those with no family history of hernia was higher in patients without family history.

Keywords: Inguinal hernia; D-Dimer; associated factors.

INTRODUCTION

This study aims to find out whether there is a correlation between D-Dimer (DD) and the factors leading up to, affecting and affected by the inguinal hernia. DD is caused by the degradation of the fibrin clot, formed by cross-linkages, by plasmin with the activation of the coagulation system for any reason (1). Clinically, DD is most commonly used in the diagnosis and follow-up of venous thromboembolism (VTE) and disseminated intra vascular coagulopathy (DIC). However, apart from these, the clinical conditions leading to an increase of DD in plasma can be listed as advancing age, new-born period, pregnancy, hospitalization, infection, tumour, recent surgery, trauma, DIC, VTE, ischemic cardiopathy, stroke, peripheral arteriopathy, aneurysm, congestive heart failure, haemolysis, bleeding, acute distressed respiratory syndrome, liver and kidney disease, inflammatory bowel disease, thrombolytic therapy and aortic rupture (2). As stated above, DD is an important marker especially in thromboembolic cases, increases in many chronic, traumatic and

degenerative processes. With reference to this, we decided to research the level of DD in the development of hernia which is a traumatic process. What led us to conduct this study was the fact that we could not find the answer to the questions that we were concerned about in the literature. In our study, we found that DD had correlations with certain parameters.

MATERIAL and METHODS

Along with their demographic data, we recorded certain values that we want to measure and compare of the patients who were admitted to our clinic and operated for inguinal hernia. These parameters and the normal range values can be listed as DD (0-300 ng/mL), CRP (0-0.5 mg/dL), ESR (0-20 mm/h), WBC ($4.6-10.2 \times 10^3$ /uL), NR (50-70%), RDW (11.6-17.2%), AST (5-30 U/L), ALT (0-55 U/L), ALP (40-150 U/L), GGT (12-64 U/L). Also, such parameters as direction of hernia, type of hernia, presence of local coexisting pathology, family history of hernia, chronic disease, BMI, COPD, heavy labour/sports history which constitute the information

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we have obtained through examination and anamnesis, were recorded. The data were analysed using the SPSS statistics software. $p < 0.05$ was considered significant.

RESULTS

The study included a total of 109 patients of whom 9 were female and 100 were male. The median age was

51 years. We analysed the correlations between the parameters which we believed to be possibly related to D-Dimer (DD) of 109 inguinal hernia patients included in our study. With reference to the results obtained, we summarized those for which we found correlations in Table 1. But, no correlation was found between D-Dimer and AST, ALT, ALP, GGT, CRP, ESR and gender.

Table 1. D-Dimer in Inguinal Hernias

		D-Dimer			statistical p-value
		Normal (n)	High (n) (%)	Total (n)	
COPD	Yes	66	28 (30%)	94	p<0.05
	No	9	6 (40%)	15	
	Total	75	34 (31%)	109	
As per BMI	Thin	2	0 (0%)	2	p<0.05
	Normal	41	15 (27%)	56	
	Overweight	28	15 (35%)	43	
	Obese	2	1 (33%)	3	
	Total	73	31 (30%)	104	
WBC	Low	2	1 (33%)	3	p<0.05
	Normal	64	26 (29%)	90	
	High	9	7 (44%)	16	
	Total	75	34 (31%)	109	
Neutrophil Rate	Low	1	0 (0%)	1	p<0.05
	Normal	70	31 (31%)	101	
	High	4	3 (43%)	7	
	Total	75	34 (31%)	109	
RDW	Normal	67	28 (29%)	95	p<0.05
	High	8	6 (43%)	14	
	Total	75	34 (31%)	109	
Chronic Disease History	No	53	23 (30%)	76	p<0.05
	Yes	22	11 (33%)	33	
	Total	75	34 (31%)	109	
Heavy Labour / Sports History	No	22	7 (24%)	29	p<0.05
	Yes	53	27 (34%)	80	
	Total	75	34 (31%)	109	
Type of Hernia	Direct	35	19 (35%)	54	p<0.05
	Indirect	39	12 (24%)	51	
	Femoral	1	3 (75%)	4	
	Total	75	34 (31%)	109	
Strangulation	No	74	31 (30%)	105	p<0.05
	Yes	1	3 (75%)	4	
	Total	75	34 (31%)	109	
Hernia	Primary	66	33 (33%)	99	p<0.05
	Recurrence	9	1 (10%)	10	
	Total	75	34 (31%)	109	
Local Coexisting Pathology	No	61	28 (31%)	89	p<0.05
	Hydrocele	3	1 (25%)	4	
	Undescended Testis	0	2 (100%)	2	
	Varicocele	9	3 (25%)	12	
	Cord Cyst	2	0 (0%)	2	
	Total	75	34 (31%)	109	
Family History of Hernia	No	50	28 (36%)	78	p<0.05
	Yes	25	6 (19%)	31	
	Total	75	34 (31%)	109	

DISCUSSION

We found a significant correlation between COPD and DD in our study. Hajibandeh et al. found that COPD was an important co-morbid factor in hernia (3). Likewise, Lau et al. found that hernia formation was more common in patients with COPD, high activity and family history of hernia (4). We found that those with no family history of hernia had a higher DD than those with a family history of hernia. Ashinditiang et al. found that the males who had a family history of hernia were more likely to have inguinal hernia (5). Jones et al. set forth that the presence of inguinal hernia in a sibling was a factor increasing the risk (6). In our study, those with history of heavy labour/sports requiring high physical activity had a DD higher than those who had no such history. In their study of 209 diseases, Carbonell et al. found that high physical activity was a risk factor in the formation of inguinal hernia, and that tall people had a higher risk of developing femoral hernia (7). Kang et al. found that the incidence of hernia was higher in those doing heavy labour (8). It can also be seen in the study of Sanjay et al. that doing heavy labour increases the likelihood of developing inguinal hernia (9).

Although it was believed that CRP and ESR are correlated with the increase in DD and that they could increase simultaneously, no correlation was found between them. Also, while we predicted that DD would be higher in recurrent hernias compared to the primary hernias, the results were quite the opposite. The fact that DD was higher in strangulated hernias and femoral hernias was in line with our predictions from the point of view of the degenerative process.

We know that the possibility of developing hernia is greater in overweight patients. That the overweight patients had higher DD rates was in line with our predictions. Although the fact that DD was found higher simultaneously with the WBC, neutrophil rate and increased RDW, this requires more detailed studies. We found that those without a family history of hernia had

a higher DD than those with family history. We also found that the DD level was higher in the cases of primary hernia compared to those of recurrent hernia. We believe that these two findings also require a more detailed research.

CONCLUSION

Despite having a low prognostic value by itself, DD may support the diagnosis process. We especially believe that it may be an important marker in strangulated and femoral hernias. Although our results are in line with our expectations in some respects, there are no results that confirm the paradoxical correlation.

Competing interests: The authors declare that they have no competing interest.

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